What is the extent to which working memory (WM) operates under the guidance of a dedicated control module (Baddeley, 2010), or more general processes of attention (Kiyonaga & Egner, 2014)?

**Questions**

- Will Internal (WM) & External Stroop tasks yield similar behavioral response times?
- Will Internal (WM) & External Stroop tasks yield similar ERP waves at about 200 ms post?
- What is the extent to which working memory (WM) operates under the guidance of a dedicated control module (Baddeley, 2010), or more general processes of attention (Kiyonaga & Egner, 2014)?

**Further Comparison: Internal (WM) & External Stroop Tasks**

- The present study used a modified version of the internal (WM) Stroop task (Kiyonaga & Egner, 2014), and a matching external control Stroop tasks.

**Conflict Adaptation**

- Reduced Stroop interference following an incongruent (i.e., word and color are different) versus a congruent (i.e., word and color are the same) trial has been proposed as a behavioral measure of the transforming effect of WM on perceptual processing (Botvinick et al., 2001).

**Congruency-Related Neuroelectric Markers (ERPs)**

- Congruency-related ERP effects can provide evidence for common neural systems operating to control distractor interference.

**Stroop tasks**

- Tasks typically yield an N450 slow wave, and external attention using a WM analog of the Stroop interference task.

**Flanker tasks**

- Flanker tasks, by contrast, often yield an N2 (e.g., negative deflection of the incongruent relative to the congruent trial-ERP waves at about 200 ms post-stroop).

**ERPs**

- For a congruency-related ERP effect for the Internal (WM) task. By contrast, the External task yielded an ERP effect for the Internal (WM) task. These results point to an earlier neural response to conflict in the stimuli for the Internal task that bears some similarity to the N2 effect often found during Flanker interference tasks. However, these results point to an earlier neural response to conflict in the stimuli for the Internal task that bears some similarity to the N2 effect often found during Flanker interference tasks. However, these results point to an earlier neural response to conflict in the stimuli for the Internal task that bears some similarity to the N2 effect often found during Flanker interference tasks.

**Region of Interest**

- Sites FC1, FC2, FC2 (see scalp maps)

**Behavioral Congruency**

- Congruency-related ERP effects can provide evidence for common neural systems operating to control distractor interference.

**Conflict Adaptation**

- Conflict adaptation effects were equivalent. Repetition of the word in WM or on successive displays led to a similar reduction in Conflict Adaptation for both tasks. Adaptive control responses to distractor conflict may be similar for internal and external attention.

**Internal (WM) & External Stroop tasks**

- Will Internal (WM) & External Stroop tasks yield similar congruency-related N2 & N450 effects?

**Will Internal (WM) & External Stroop tasks**

- Will Internal (WM) & External Stroop tasks yield similar behavioral (i.e., response time) results?

**Method**

- 29 right-handed participants, 2 dropped due to too many artifact trials.
- 3.5-softly ordered trial sequences crossed stimulus parameters, 75% congruent trials
- Button press response, color of patch & final memory test

**EEG Measurement**

- 64-channel cap (expanded 10-20 cap) Neuroscan SynAmps 2 system
- Bandpass filtered (0.1, 30 Hz), artifact rejection 100 µV peak-to-peak, epoched (200, 1000 ms)
- Electrodes of Interest: Central Parietal Left (ERP) & Right (C3P)

**DISCUSSION**

1. Consistent with Kiyonaga and Egner (2014) the behavioral Stroop interference effects are quite similar across Internal and External tasks. However, the Display 2 interference effect was not significant for the Internal task condition, perhaps indicating a tendency for occasional lapses of maintenance of activation in the distractor in WM.

2. Conflict Adaptation effects were equivalent. Repetition of the word in WM or on successive displays led to a similar reduction in Conflict Adaptation for both tasks. Adaptive control responses to distractor conflict may be similar for internal and external attention.

3. The most surprising finding of this study is the emergence of an N2-like congruency-related ERP effect for the Internal (WM) task. By contrast, the external task yielded an N450 effect as expected for a variant of a traditional Stroop task. These results point to an earlier neural response to conflict in the stimuli for the Internal task that bears some similarity to the N2 effect often found during Flanker interference tasks. However, these results are tentative due to both effect not reaching statistical sig. (p =.064 for both effects).